Patent claims

1. Method of demodulating digital data using M'ary QAM, comprising the steps of

detecting a complex symbol vector D,

establishing within which reference symbol boundaries the detected symbol vector D falls, the given reference symbol boundaries being associated with a complex reference vector R,

establishing quadrature components (E_I and E_Q) of an error vector (E) constituting the difference between the detected vector D and the associated reference vector R, and seeking to approximate an error control signal (E') as feed back signal in the demodulation stage,

whereby if the detected symbol vector (D) falls within a first sector (A) in the complex plane surrounding the imaginary axis (Q), the first sector being delimited by at least two lines crossing origin, the first sector being symmetrical with regard to the imaginary axis, approximating the error control signal (E') by the imaginary quadrature component (E_I) of the error vector (E), and

whereby if the detected symbol vector (D) falls within a second sector (B) in the complex plane surrounding the real axis (I), the second sector being delimited by at least two lines crossing origin, the second sector being symmetrical with regard to the real axis, approximating the error control signal (E') by the real quadrature component (E_I) of the error vector (E).

2. Method of demodulating digital data using M'ary QAM according to claim 1,

whereby the first sector is delimited by the area $|D\_Q| \geq |D\_I|$

and the second sector is delimited by the area $|D\_Q| < |D\_I|$.

3. Method of demodulating digital data using M'ary QAM according to claim 1, whereby

the first sector is delimited by the area $|D\_Q| \geq 2 \cdot |D\_I|$,

the second sector is delimited by the area $|D\_Q| < ½ \cdot |D\_I|$, and

if the detected symbol vector (D) belongs neither to the first sector nor to the second sector, approximating the control error signal (E') by the mean value of the real quadrature component (E_I) and the imaginary quadrature component (E_Q).

4. Method of demodulating digital data using M'ary QAM, comprising the steps of

detecting a complex symbol vector (D),

establishing within which reference symbol boundaries of a given symbol boundary size (T) the detected symbol vector (D) falls, the given reference symbol boundaries being associated with a complex reference vector (R),

establishing quadrature components (E_I and E_Q) of an error vector (E) constituting the difference between the detected vector (D) and the associated reference vector (R),

deriving a control error signal (E') from the error vector (E), the control error signal

using a weighted error signal (WE) being a function of the derived error signal (E') as a feed-back signal in the demodulation stage, whereby

the weighted error signal (WE)

- approaches zero for error signals (E) approaching zero,

- attains a positive value for positive values close to zero and attains a negative value for negative values close to zero,

- approaches zero when the error signal vector approaches the symbol boundaries of the detected symbol,

5. Method according to claim 4, wherein if the error signal vector (E) exceeds the symbol boundaries, the weighted error signal (WE) attains a reduced value or a zero value.

6. Method according to claim 5, wherein the error signal is reduced according to

$$WE = E'(1-\frac{2W}{T})$$

where E' corresponds to the deviated control error (E') and T corresponds to the symbol boundary size and where W = Max {abs(E_I); abs(E_Q)}.

7. Method according to any of claims 4 - 6, wherein no weighting is performed for outer corner portions (34) of the M'ary QAM constellation.

8. Method according to claim 7, wherein if the detected signal (D) falls outside the symbol boundaries along the Q and I axes (36), the weighting function WE=0 is applied.